Claims

[c1] A uted tomographic (CT) imaging system for performing a CT scan, said CT system comprising:
a detector array comprising a plurality of detector cells;
a processor operationally coupled to said detector array, said processor configured to:
receive first data regarding a first x-ray spectral range from a first detector cell;
receive second data regarding a second x-ray spectral range different from the first x-ray spectral range from a second detector cell different from the first detector cell; and
determine spectral information from the first data and the second data.

[c2] 2.A system in accordance with Claim 1 wherein said CT system further comprises an x-ray tube, said tube configured to produce a spatially variant x-ray energy distribution in a Z direction.

[c3] 3.A system in accordance with Claim 1 wherein said CT system further comprises an x-ray tube on a rotating gantry, said x-ray tube configured to emit x-rays at a first x-ray spectral range and a second x-ray spectral range different from the first x-ray spectral range during the rotation of said gantry during a single scan.

[c4] 4.A system in accordance with Claim 1 wherein said CT system further comprises:
an x-ray source positioned to emit x-rays toward said detector array; and
at least one x-ray energy filter positioned between said source and said detector array.

[c5] 5.A system in accordance with Claim 4 wherein said x-ray energy filter is positioned between said x-ray source and an object being imaged.

[c6] 6.A system in accordance with Claim 4 wherein said x-ray energy filter is positioned in an x-ray collimator between said x-ray source and an object imaged.

[c7] 7.A system in accordance with Claim 4 wherein said x-ray energy filter is

positioned between an object being imaged and said detector array.

[c8] 8.A system in accordance with Claim 4 wherein said x-ray energy filter comprises a plurality of discrete filter elements separated by intervening air paths and oriented in a Z direction.

[c9] 9.A system in accordance with Claim 4 wherein said x-ray energy filter comprises a variable filter.

[c10] 10.A system in accordance with Claim 8 wherein said discrete filter elements each have substantially the same x-ray absorption property.

[c11] 11.A system in accordance with Claim 8 wherein one of said discrete filter elements has a first x-ray absorption property and one of said discrete filter elements has a second x-ray absorption property different from the first.

[c12] 12.A system in accordance with Claim 4 wherein said x-ray energy filter comprises at least one of a stepped filter, a sloped filter, a plurality of K edge filters, and a set of paired K edge filters in a Z-axis direction.

[c13] 13.A system in accordance with Claim 1 further comprising an x-ray source outputting a single x-ray spectrum wherein said first detector cell detects a different x-ray subspectrum than said second detector cell.

[c14] 14.Athod for scanning an object, said scanning comprises scanning an object by at least one of:
scanning the object while varying a peak kiloelectronvolt to an x-ray tube;
scanning the object with a filter such that a plurality of x-ray spectra are received by a detector array; and
scanning the object such that elements of a detector array discriminate between a plurality of x-ray spectra and generate signals based on the x-ray spectra.

[c15] 15.Athod for determining the presence of an analyte in an object with a computed tomographic (CT) imaging system, said method comprising:
receiving first data regarding a first x-ray spectral range from a first detector cell;
receiving second data regarding a second x-ray spectral range different from

the first x-ray spectral range from a second detector cell different from the first detector cell; and

determining spectral information from the first data and the second data.

[c16] 16.Aputed tomographic (CT) imaging system for performing a CT scan, said CT system comprising:

a detector array comprising a plurality of detector cells;

an x-ray source positioned to emit x-rays toward said detector array; and

a processor operationally coupled to said detector array, said processor configured to:

receive first data regarding a first x-ray spectral range from a first detector cell;

receive second data regarding a second x-ray spectral range different from the first x-ray spectral range from a second detector cell different from the first detector cell; and

determine spectral information from the first data and the second data.

[c17] 17.A system in accordance with Claim 16 wherein said x-ray source comprises an x-ray tube configured to produce a spatially variant x-ray energy distribution in a Z direction.

[c18] 18.A system in accordance with Claim 16 further comprising a rotating gantry, said x-ray source configured to emit x-rays at a first x-ray spectral range and a second x-ray spectral range different from the first x-ray spectral range during the rotation of said gantry during a single scan.

[c19] 19.A system in accordance with Claim 16 further comprising a plurality of x-ray energy filter elements separated by intervening air paths and oriented in a Z direction.

[c20] 20.A system in accordance with Claim 19 wherein at least one said x-ray energy filter is positioned between said x-ray source and an object being imaged.

[c21] 21.A system in accordance with Claim 19 wherein at least one said x-ray energy filter is positioned between said detector and an object being imaged.

[c22] 22.A system in accordance with Claim 19 wherein said discrete filter elements

each have substantially the same x-ray absorption property.

[c23] 23.A system in accordance with Claim 19 wherein one of said discrete filter elements has a first x-ray absorption property and one of said discrete filter elements has a second x-ray absorption property different from the first.